

AIDES

Docket No.: 5079D1-07-LAV

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
APPLICATION TRANSMITTAL

Date: February 16, 1999

Honorable Assistant Commissioner  
of Patents and Trademarks  
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the patent application of  
inventors(s): Mary Katherine Robinson, Colleen Marie Kramer, and Michael Glass

For (title): CRUNCHY CHEWING GUM

Which is a:

- ☐ parent
- ☐ continuation
- ☐ continuation-in-part
- ☒ divisional
  
- ☒ pursuant to 37 C.F.R. §1.53(b)
- ☐ pursuant to 37 C.F.R. §1.53(d)

This application claims benefit

- ☒ pursuant to 35 U.S.C. §120 of prior U.S. application  
Serial No.: 08/806,969                      Filed: February 26, 1997
- ☐ pursuant to 35 U.S.C. §119(e) of prior U.S. application  
Serial No.:                      Filed:
- ☐ pursuant to 35 U.S.C. §119(a)-(d) of prior foreign application  
filed \_\_\_\_\_ in \_\_\_\_\_ as application no. \_\_\_\_\_.  
A certified copy of the original foreign application,  
specification and drawings

Enclosed please find:

- 1.     ☐ **SPECIFICATION INCLUDING CLAIMS**

This application includes:  
\_\_\_\_\_ Pages of Specification  
\_\_\_\_\_ Pages of Abstract  
\_\_\_\_\_ Pages of Claims  
\_\_\_\_\_ Sheets of Drawing figures

=====

**CERTIFICATION PURSUANT TO 37 C.F.R. §1.10**

I hereby certify that this Application Transmittal and the documents referred to as enclosed herein are being deposited with the United States Postal Service on this Date 2/16, 1999, in an envelope bearing "Express Mail Post Office to Addressee" Mailing Number EJ537161353US addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Christine Cicenia  
(Typed or printed name of person mailing)  
Christine Cicenia 2/16/99  
(Signature of person mailing papers, Date)

02/16/99  
jc631 U.S. PTO

jc612 U.S. PTO  
09/250834  
02/16/99

08250834 624369

2. ☒ **AMENDMENTS**

☐ A preliminary amendment pursuant to 37 C.F.R. §1.121 is attached.

☒ Amend the specification by inserting before the first line the sentence:

This is a ☐ continuation  
☐ continuation-in-part  
☒ divisional

of copending application Serial No. 08/806,969  
filed on February 26, 1997

☐ Amend specification by inserting before the first line the sentence:

This application claims priority to provisional application

Serial No.:  
Filed:

☒ Amendments to claims:

☒ Amend the claims by deleting claims 1-22.

☐ Amend the claims by adding new claims \_\_\_ set forth in the preliminary amendment.

3. ☐ **COMBINED DECLARATION AND POWER OF ATTORNEY**

☐ Enclosed

☐ Not enclosed. This application is made by a person authorized pursuant to 37 C.F.R. §1.41(c) on behalf of all of the above-named inventors. The declaration or oath, along with the surcharge required by 37 C.F.R. §1.16(e) will be filed subsequently.

4. ☐ **DRAWINGS**

Drawings pursuant to 37 C.F.R. §1.81.

☐ formal.  
☐ informal.

5. **FILING FEE**

CLAIMS AS FILED				BASIC FEE
	NUMBER FILED	NUMBER EXTRA	RATE	\$760.00
Total Claims	<u>18</u>	- 20 = <u>0</u> x	\$ 22.00=	-0-
Independent Claims	<u>2</u>	- 3 = <u>0</u> x	\$ 82.00=	-0-
Multiple dependent claim(s), if any			\$270.00=	-----
TOTAL				\$760.00

☐ Processing and retention fee  
(37 C.F.R. §§ 1.53(d) and 1.21(1))

**TOTAL FEES \$760.00**

- [ ] No filing fee is to be paid at this time. The filing fee and the surcharge required by 37 C.F.R. §1.16(e) will be paid subsequently.
- [X] Charge Deposit Account 23-0453 in the amount of \$ 760.00 (total fees) A triplicate copy of this transmittal is attached.
6. [ ] **AN ASSIGNMENT** of this invention to Warner-Lambert Company, 201 Tabor Road, Morris Plains, New Jersey 07950:
- [ ] is enclosed.
- [ ] will follow.


**7. AUTHORIZATION TO CHARGE ADDITIONAL FEES**

- [X] The commissioner is hereby authorized to charge all fees required during the entire pendency of this application except the issue fee to Deposit Account 23-0453.

**8. INSTRUCTIONS AS TO OVERPAYMENT**

- [X] Credit any overpayment to Deposit Account 23-0453.

Respectfully submitted,

  
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5079-07-LAV

UNITED STATES PATENT APPLICATION

FOR

CRUNCHY CHEWING GUM

Inventors:

Mary Katherine Robinson  
Colleen Marie Kramer  
Michael Glass

## CRUNCHY CHEWING GUM

### Technical Field

5           The present invention pertains to crunchy  
chewing gum wherein the crunch is provided by a  
granulated isomalt additive. More particularly, the  
present invention pertains to sugarless chewing gum  
exhibiting crunchiness.

10

### Background Art

          The art of chewing gum manufacture is well  
established. Suitable gum formulations traditionally  
15       contain a substantial quantity of one or more water-  
insoluble elastomers, either natural, synthetic, or  
both, flavorants, sweeteners and the like. More  
recently, sugarless gums containing synthetic, high  
intensity sweeteners encouraging low calorific  
20       content, and/or non-conventional di- and  
polysaccharides, particularly those which are non-  
cariogenic, have become increasingly popular.  
Considerable research has been expended to formulate  
sugarless gums which retain sugared-based gum  
25       properties, such as texture, flavor retention and  
storage stability, among others.

          Sugar-based gums with a crunch have recently  
become important commercially. Such gums contain  
30       crystals of sucrose, or granulated sugar, which  
provide the needed crunch. The crunch provided by  
granulated sugar is described as firm and slightly  
gritty in nature. An acceptable, yet crunchy

substitute, needs to be found for the manufacture of  
crunchy sugarless gums. In order to be commercially  
acceptable, it is preferred that the sugarless  
substitute have a long chew time before the  
5 crunchiness has substantially dissipated, and a  
prolonged storage time. In this regard, crunch-  
providing gums having internally distributed crunch  
additives are not similar to gums having a hard  
outside coating, as the manufacturing and storage  
10 problems are quite different. It is also preferred  
that the crunch provided by the sugarless substitute  
be similar to that provided by granulated sugar.

Polyols known as sugar alcohols are  
15 potential candidates for providing sugarless crunch.  
Examples are sorbitol, mannitol, maltose, xylitol, and  
the like. However, in addition to providing crunch,  
the particular polyol must be storage stable, i.e. the  
crunchiness must be retained after a commercially  
20 acceptable storage time. Further, the flavors and  
softeners in the gum product should not soften the  
polyol and thus reduce the crunch, and the process for  
formation of the additive should be economically  
feasible.

25  
It would be desirable to provide a sugarless  
additive which can be utilized to form a chewing gum  
product having a crunchy feel, in particular, a  
crunchy feel similar to that provided by granulated  
30 sugar, and which maintains this crunchy feel over an  
extended period of chew time. It would be further  
desirable to provide a gum having a crunchy feel which  
maintains this characteristic under commercially  
desirable storage conditions.

### **Summary Of The Invention**

5

The present invention concerns a chewing gum comprising: (a) one or more elastomers, sweeteners and flavorants, and (b) an amount of a granulated isomalt additive having a particle size greater than about 50 mesh such that said additive provides a crunch to said gum.

The invention also concerns the crunch additive, and processes for the preparation of the crunch additive and chewing gums containing same.

### **Brief Description of the Preferred Embodiments**

The present invention pertains to chewing gums containing crystalline isomalt as a crunch-providing additive. Crystalline, granulated isomalt prepared by heating isomalt or an isomalt solution to a temperature above 130°C followed by cooling and granulation, can be incorporated internally into gum formulations to provide crunch, in particular, a desirable crunch having texture and mouth feel similar to that provided by granulated sugar. The isomalt additive provides for a long lasting crunch and commercially acceptable storage time as compared to other crystalline polyols.

The crystalline isomalt must be employed in a size range which provides for a crunch while chewing.

Isomalt crystals having a size greater than 50 mesh (.300 mm), preferably greater than 40 mesh (.425 mm), and more preferably in the range of 30 (.600 mm) to 40 mesh have been found suitable. The gum formulation  
5 may be for any type of gum, i.e. chewing gum or bubble gum, and may be provided in any of the traditional gum forms, i.e. sticks, blocks, hard coated pellets, and the like. In accordance with the present invention, the crunch additives are internal, i.e. the crunch is  
10 not derived from the coating surrounding hard-coated gum products.

The crunch additive consists substantially of isomalt, optionally containing flavoring agents, coloring agents, and less preferably containing most  
15 minor quantities of other polyols. The term "most minor" means less than 20 weight percent based on the weight of the crunch additive. Preferably, no more than 10 weight percent of the crunch additive  
20 comprises another polyol, and most preferably, the sole polyol is isomalt. The term "isomalt" as used herein includes these most minor quantity of other polyols unless the clear language indicates otherwise.

The crystalline isomalt is prepared from commercially available isomalt such as, for example, PALATINIT PF from Suddeutsche Zucker. The isomalt is heated to a relatively high temperature prior to being allowed to crystallize. The crystalline isomalt may  
25 alternatively be prepared from a solution of isomalt in water. Where solutions of isomalt are used, for ease of processing it is preferred to use concentrated solutions with a 70:30 ratio of isomalt: water being especially preferred. In either instance the isomalt  
30



is heated to a temperature above 130°C, preferably above 145°C, and most preferably to about 160°C, or higher. The resultant melt is poured into a pan and allowed to crystallize for a sufficient time at room  
5 temperature. A period of 18 hours has been found sufficient. However, shorter or longer times may be used as well. It is preferable to avoid supercooling the melts.

10 Any granulation method known to those skilled in the art can be used to granulate the material. A preferred method uses granulation equipment such as the "Crack-U-Lizer" model of Modern Process Equipment, Inc. The glassy material is first  
15 broken up by any suitable method, to a feed size, preferably in a hopper where it can then be fed to the granulator which has been pre-set for the predetermined particle size distribution. It is also contemplated to crystallize the isomalt by extrusion  
20 at relatively high temperature, for example as discussed in U.S. Patent No. 5,472,733. If extrusion is used, the use of isomalt solutions is less preferable.

25 Colorants, dyes and/or flavorants may be optionally added to the crunch additive. Flavorants are preferably added to the melted isomalt during the cooling phase preferably at a point where the melt has cooled to a temperature below the flash point of the  
30 flavorant. Such determinations are well within the skill of those skilled in the gum arts. Colorants and dyes may also be added with the flavorant or may be mixed with the isomalt prior to heating.

Suitable particle sizes are attained through conventional techniques. The particle size is larger than 50 mesh, preferably larger than 40 mesh, and more preferably in the range of 30-40 mesh. Smaller  
5 particle sizes than about 50 mesh will not provide a suitable crunchy feel for any length of time due to their small size, and may suffer from plasticization by water or other gum components during storage. Larger particle sizes are also useful, however. It is  
10 understood that the particle sizes herein are those retained by a screen having the cited mesh size, and that the actual particle size will include some particles which are smaller than the particular mesh size. Moreover, an additive of a given average  
15 particle size will be expected to have a somewhat smaller average particle size due to some reduction in size during the gum blending operation. Talc and other processing aids such as calcium carbonate may be added when necessary, for example to minimize surface  
20 tack.

The gum formulation itself may be varied appropriately to suit the type of gum produced, i.e. chewing or bubble gum. Although the material provided  
25 is a sugarless product, one could use the material in a sugar-based gum or in a gum containing both sugars and sugar alcohols as the bulking agents. For a sugarless gum formula, the gum is preferably anhydrous, although the gum formulation need not be  
30 anhydrous. Examples of suitable gum formulations may be found in U.S. Patent Nos. 4,961,935; 4,514,422; 4,382,963; 4,579,738, and the like, which are incorporated herein by reference.

It is preferred to employ in a gum formulation containing the sugarless crunch material, from 5 to 50% of gum base; from 2 to 10% softeners; from 0.5 to 5% flavoring; from 0-2% intense sweeteners; from 0 to 1% colorants; and from 1 to 70% bulking agents, all percentages given in parts by weight.

For sugarless gums the bulking agent is a polyalcohol (polyol). The polyalcohol may comprise any conventional bulking polyalcohol, i.e. sorbitol, mannitol, xylitol, isomalt, erythritol, maltitol, etc., in finely granulated or powdered form. The crunchy chewing gum compositions may be used to provide a variety of chewing gum product formats, such as sticks, slabs, chunks, balls, ropes, tablets, and center filled and confectionery coated gum products.

The amount of crunch additive to be used in the finished chewing gum product depends on several factors including the particle size distribution obtained in preparing the crunch product and the effect desired. In general, less than 9% by weight would be unsuitable in providing sufficient crunch. While amounts greater than 16% would provide crunch such amount would only be useful for novelty effects since such amounts are excessive and may overwhelm the desired effect. A preferred range of additive would be from 10-15% by weight of the gum product.

The gum base employed in the present invention can vary depending upon factors such as the type of base desired, the consistency of gum desired and the other components used in the composition to make the final chewing gum product. The gum base may be any

water-insoluble gum base known in the art, and includes those gum bases utilized for chewing gums and bubble gums. Illustrative examples of suitable polymers in gum bases include both natural and  
5 synthetic elastomers and rubbers. In this regard, polymers which are suitable as gum bases include, without limitation, elastomers of vegetable origin such as chicle, natural rubber, crown gum, nispero, rosidinha, jelutong, perillo, niger gutta, tunu,  
10 balata, guttapercha, lechi capsii, sorva, gutta kay, mixtures thereof, and the like. Synthetic elastomers such as butadiene-styrene copolymers, polyisobutylene, isobutylene-isoprene copolymers, polyethylene, mixtures thereof, and the like, are also useful.  
15 Suitable gum bases may also include a non-toxic vinyl polymer, such as polyvinyl acetate and its partial hydrolysate, polyvinyl alcohol, and mixtures thereof. When utilized, the molecular weight of the vinyl polymer may range from about 2,000 to about 94,000  
20 Daltons (Da).

The amount of gum base employed will also vary depending upon factors such as the type of base used, the consistency of the gum desired and the other  
25 components used in the composition to make the final chewing gum product. In general, the gum base will be present in amounts from about 5% to about 50%, preferably in amounts from about 15% to about 40%, and more preferably in amounts from about 23% to about  
30 35%, by weight of the final chewing gum composition.

The gum base may also include plasticizers or softeners such as lanolin, palmitic acid, oleic acid, stearic acid, sodium stearate, potassium

stearate, glyceryl triacetate, glyceryl lecithin, glyceryl monostearate, propylene glycol monostearate, acetylated monoglyceride, glycerine, mixtures thereof, and the like. Waxes, for example, natural and  
5 synthetic waxes, hydrogenated vegetable oils, organic waxes such as polyurethane waxes, polyethylene waxes, paraffin waxes, microcrystalline waxes, fatty waxes, sorbitan monostearate, tallow, polypropylene glycol, mixtures thereof, and the like, may also be  
10 incorporated into the gum base. Such materials are incorporated into the gum base to provide a variety of desirable textures and consistency properties. Because of the low molecular weight of these ingredients, they are able to penetrate the  
15 fundamental structure of the gum base making it plastic and less viscous. These additional materials are generally employed in amounts up to about 18%, preferably in amounts from about 5% to about 18%, and more preferably in amounts from about 10% to about  
20 14%, by weight of the gum base.

In a preferred embodiment, the softening agent is glycerin, such as the commercially available United States Pharmacopeia (USP) grade. Glycerin is a  
25 syrupy liquid with a sweet warm taste and has a sweetness of about 60% of cane sugar.

The gum base may also include effective amounts of mineral adjuvants such as calcium  
30 carbonate, magnesium carbonate, alumina, aluminum hydroxide, aluminum silicate, talc, tricalcium phosphate, dicalcium phosphate and the like, as well as mixtures thereof. These mineral adjuvants may serve as fillers and textural agents. These fillers

or adjuvants may be used in the gum base in various amounts. Preferably, the amount of filler, when used, will be present in an amount up to about 60%, by weight of the chewing gum base.

5

Effective amounts of a variety of traditional ingredients further may be included in the gum base, such as coloring agents, antioxidants, preservatives, and the like. For example, titanium  
10 dioxide and other dyes suitable for food, drug and cosmetic applications, known as F.D. & C. dyes, may be utilized. An anti-oxidant such as butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA),  
propyl gallate, and mixtures thereof, may also be  
15 included. Other conventional chewing gum additives known to one having ordinary skill in the chewing gum art may also be used in the chewing gum base.

The chewing gum composition containing the  
20 base may include effective amounts of conventional additives selected from the group consisting of non-sucrose sweetening agents (sweeteners), plasticizers, softeners, emulsifiers, waxes, fillers, bulking agents (carriers, extenders), mineral adjuvants, flavoring  
25 agents (flavors, flavorings), coloring agents (colorants, colorings), antioxidants, acidulants, thickeners, mixtures thereof, and the like. Some of these additives may serve more than one purpose. For example, in sugarless gum compositions, a sweetener,  
30 such as sorbitol or other sugar alcohol or mixtures thereof, may also function as a bulking agent.

The plasticizers, softening agents, mineral adjuvants, coloring agents, waxes and antioxidants

discussed above, as being suitable for use in the gum base, may also be used in the gum composition. Examples of other conventional additives which may be used include emulsifiers, such as lecithin and  
5 glyceryl monostearate, thickeners, used alone or in combination with other softeners, such as methyl cellulose, alginates, carrageenan, xanthan gum, gelatin, carob, tragacanth, locust bean, and carboxy  
10 methyl cellulose, acidulants such as malic acid, adipic acid, citric acid, tartaric acid, fumaric acid, and mixtures thereof, and fillers, such as those discussed above under the category of mineral  
adjuvants. The fillers, when used, may be utilized in an amount up to about 60%, by weight of the gum  
15 composition.

The flavoring agents which may be used include those flavors known to the skilled artisan, such as natural and artificial flavors. These  
20 flavorings may be chosen from synthetic flavor oils and flavoring aromatics and/or oils, oleoresins and extracts derived from plants, leaves, flowers, fruits, and so forth, and combinations thereof. Nonlimiting representative flavor oils include spearmint oil,  
25 cinnamon oil, oil of wintergreen (methyl salicylate), peppermint oil, clove oil, bay oil, anise oil, eucalyptus oil, thyme oil, cedar leaf oil, oil of nutmeg, allspice, oil of sage, mace, oil of bitter almonds, and cassia oil. Also, useful flavorings are  
30 artificial, natural and synthetic fruit flavors such as vanilla, and citrus oils including lemon, orange, lime, grapefruit, and fruit essences including apple, pear, peach, grape, strawberry, raspberry, cherry, plum, pineapple, apricot and so forth. These

flavoring agents may be used in liquid or solid form and may be used individually or in admixture. Commonly used flavors include mints such as peppermint, menthol, artificial vanilla, cinnamon derivatives, and various fruit flavors, whether employed individually or in admixture.

Other useful flavorings include aldehydes and esters such as cinnamyl acetate, cinnamaldehyde, citral diethylacetal, dihydrocarvyl acetate, eugenyl formate, p-methylamisol, and so forth may be used. Generally any flavoring or food additive such as those described in Chemicals Used in Food Processing,, publication 1274, pages 63-258, by the National Academy of Sciences, may be used.

The flavoring agents of the present invention may be used in many distinct physical forms well known in the art to provide an initial burst of flavor and/or a prolonged sensation of flavor. Without being limited thereto, such physical forms include free forms, such as spray dried, powdered, and beaded forms, and encapsulated forms, and mixtures thereof.

The coloring agents useful in the present invention are used in amounts effective to produce the desired color. These coloring agents include pigments which may be incorporated in amounts up to about 6%, by weight of the gum composition. A preferred pigment, titanium dioxide, may be incorporated in amounts up to about 2%, and preferably less than about 1%, by weight of the gum composition. The colorants may also include natural food colors and dyes suitable



for food, drug and cosmetic applications. These colorants are known as F.D.&C. dyes and lakes. The materials acceptable for the foregoing uses are preferably water-soluble. A full recitation of all F.D.&C. colorants and their corresponding chemical structures may be found in the Kirk-Othmer Encyclopedia of Chemical Technology, 3rd Edition, in volume 5 at pages 857-885, which text is incorporated herein by reference.

10

The flavorants, colorants and dyes may likewise be optionally added to the crunch additive as previously described.

15

The apparatus useful in accordance with the present invention for manufacture of the chewing gum comprises mixing and heating apparatus well known in the chewing gum manufacturing arts, and therefore the selection of the specific apparatus will be apparent to the artisan. In preparing a gum, a composition is made by admixing the gumbase composition with the crunch additive and the other ingredients of the final desired composition. Other ingredients will usually be incorporated into the composition as dictated by the nature of the desired composition as well known by those having ordinary skill in the art. The ultimate chewing gum compositions are readily prepared using methods generally known in the food technology and pharmaceutical arts.

20  
25  
30

For example, a gum base is heated to a temperature sufficiently high to soften the base without adversely affecting the physical and chemical make up of the base. The optimal temperatures

utilized may vary depending upon the composition of the gum base used, but such temperatures are readily determined by those skilled in the art without undue experimentation. The gum base is conventionally  
5 melted at temperatures that range from about 60°C. to about 120°C. for a period of time sufficient to render the base molten. For example, the gum base may be heated under those conditions for a period of about thirty minutes just prior to being admixed  
10 incrementally with the remaining ingredients of the gum such as plasticizers, softeners, bulking agents, sweeteners, and the crunch additive and/or fillers, coloring agents and flavoring agents to plasticize the blend as well as to modulate the hardness,  
15 viscoelasticity and formability of the base. Mixing is continued until a uniform mixture of gum composition is obtained. Thereafter the gum composition mixture may be formed into desirable chewing gum shapes.

20  
Confectionery coated chewing gum compositions incorporating the inventive sugarless crunchy chewing gum compositions are also within the scope of the invention. Such confectionery coated  
25 compositions contain the inventive sugarless crunchy chewing gum composition as the center or core portion of the chewing gum product and a confectionery material as a coating over the center portion. The confectionery material may be either a sugar material  
30 or a sugarless material, and preferably is a sugarless confectionery material.

The confectionery coated chewing gum compositions may be prepared using standard techniques

and equipment known to those skilled in the art. The apparatus useful in accordance with the present invention comprises mixing, heating, coating (dusting) and drying apparatus well known in the chewing gum manufacturing arts, and therefore the selection of the specific apparatus will be apparent to the artisan.

In such a method, a composition is made by admixing the inventive sugarless, substantially anhydrous chewing gum composition as set out above with the other ingredients of the desired core portion composition. The homogeneous mixture is then formed into portions which are then placed in a revolving coating pan. A confectionery coating syrup is prepared, heated if necessary, and then applied to the gum portions. The coated gum portions are then allowed to cool and dry. Various ingredients will usually be incorporated into the confectionery coating composition as dictated by the nature of the desired composition as well known by those having ordinary skill in the art.

Having generally described this invention, a further understanding can be obtained by reference to certain specific examples which are provided herein for purposes of illustration only and are not intended to be limiting unless otherwise specified.

30

#### Examples

Example 1: Preparation of Isomalt Granulates

5        1a. An isomalt granulate was prepared by  
heating a 70:30 isomalt/water mixture to 160°C, pouring  
the melt into a metal tray and allowing it to stand  
and cool for 18 hours. The cooled and hardened  
crystalline product was crushed and sieved through a  
20 mesh screen. Further size classification produced  
10 granulates in the 30 to 40 mesh range. A five-week,  
moisture pick-up comparative study of the 1a processed  
isomalt and unprocessed isomalt showed no loss of  
stability due to processing.

15        1b: An isomalt granulate was similarly  
prepared as in 1a using powdered isomalt. The isomalt  
was slowly heated to 160°C with melting, poured into  
metal trays, cooled, and sieved as in 1a.

20        Comparative Examples C1-C4: Preparation of Polyol  
Granulates

25        C1: A 70:30 mixture of xylitol and water  
was heated to 160°C and cooled as in Example 1a.  
Granulates were prepared as in Example 1a.

30        C2: Preparation of maltitol granulates from  
10%, 5%, and 2.5% aqueous maltitol solutions was  
attempted, using the procedure of Example 1a. In all  
cases, crystal preparation proved difficult.  
Crystalline granulate having a mesh size of 20 to 30  
was finally prepared by heating 2.5% aqueous maltitol  
to 180°C followed by cooling for 24 hours.

C3, C4: Samples of sorbitol and mannitol were similarly mixed with water, heated to 160°C and cooled both independently and in admixture. No recrystallization was observed upon cooling and therefore no granulate having an acceptable particle size could be prepared.

Examples 2, 3, C5 and C6: Chewing Gum Preparation

A series of chewing gum samples were prepared by conventional methods employing the following gum formulation:

Formula I: Chewing Gum

<u>Ingredients</u>	<u>Percentage %</u>
Gum Base	26.0
Softeners	6.5
Flavor(s)	1.5
Intense Sweeteners	0.52
Polyalcohols*	65.48

\* Total Polyalcohol includes weight of granulated material.

The sugarless crunch was added with the intense sweeteners to the gum mixture containing partially mixed gum ingredients. The gum was mixed until completion of the full mixing cycle, removed from the gum kettle and rolled and scored in the conventional manner. The gum samples were formulated using the granulates prepared in the prior examples as follows:

TABLE 1

	<u>Gum Example</u>	<u>Granulate Example</u>	<u>% Granulate</u>
	2	1a	10
	3	1b	16
5	C5	C1	10
	C6	C2	16

10 No formulations were prepared from sorbitol or mannitol (Example C3 and C4) since granulates could not be prepared from these polyols or their mixtures.

#### Comparative Tests

15 Chew studies of the granulate-containing gums were conducted by a panel of four experts in the gum arts. The studies were two-fold: (1) duration of crunch studied over time and (2) organoleptic effects. The samples were stored at 37°C in a stability oven to  
20 provide an accelerated aging process over the 12 week study period. Chews were made at various intervals. Crunch results were measured by noting the time over which the crunch was maintained. Organoleptic evaluation was done on sensory impressions.

25 Table 2 shows the comparative chew test results initially and after extended storage, the chew tests being taken at two-week intervals. The numbers indicate duration in minutes and seconds.

30

TABLE 2

<u>Example</u>	<u>Initial</u>	<u>Week 2</u>	<u>Week 4</u>	<u>Week 6</u>	<u>Week 8</u>	<u>Week 12</u>
2	2:30	2:20	1:55	1:35	1:00	
	0:45					
3	1:51	1:51	1:51	1:51	1:20	1:00
5 C5	1:30	1:30	1:30	1:30	0:50	0:40

Example C6, the gum containing the maltitol granulates, is not included in the table. C6 was evaluated as having good initial crunch but the granulates proved unstable within a gum formulation, the granulates having plasticized within one week of the test period.

Table 2 indicates that both xylitol (Example C5) and isomalt (Example 2) can provide crunch duration. With xylitol, however, the initial chew time before crunch disappears is lower than with isomalt. The Example 3 gum containing 16% amount of the isomalt crunch additive exhibited slightly less initial crunch duration as compared to the gum of Example 2, but provided extended stability of the crunch duration.

The gum products of Examples 2, 3 and C5 were concomitantly evaluated for organoleptic impressions (sensory impressions) during the crunch duration tests. The expert panel found that the Example 2 gum provided a crunch which was very similar to that of granulated sugar, firm and slightly gritty in nature, the desired texture and effect necessary for a "crunch" gum. The crunch remained consistent for 2+ minutes and gradually diminished during a 5 minute chew. Example 3 was evaluated as similar to Example 2 in effect. The crunch of the Example C5 gum was

evaluated as softer by comparison. The granulates were found to have a tendency to melt in the mouth during chew, rather than crunch or pop, upon chewing.

5 The panel concluded that while C5 provided a stable gum product it did not meet the necessary criteria (organoleptic requirements) for crunch in the gum's chew texture.

10 Having now fully described the invention, it will be apparent to one of ordinary skill in the art that many changes and modifications can be made thereto without departing from the spirit or scope of the invention as set forth herein.



**What Is Claimed Is:**

1. A chewing gum comprising: (a) one or more elastomers, sweeteners and flavorants, and (b) an amount of a granulated isomalt additive having a particle size greater than about 50 mesh such that said additive provides a crunch to said gum.
2. The gum of claim 1 wherein said gum is a sugarless gum.
3. The gum of claim 1 wherein said additive is prepared by heating isomalt at a temperature of 130°C or higher, cooling to form a solid isomalt product, and granulating said solid isomalt product to a particle size greater than 50 mesh.
4. The gum of claim 3 wherein said additive is prepared by dissolving isomalt in water to form a solution and heating said solution to a temperature in excess of 130°C prior to cooling.
5. The gum of claim 3 wherein said isomalt is heated to a temperature of above 145°C.
6. The gum of claim 5 wherein said isomalt is heated to a temperature of above 160°C
7. The gum of claim 1 wherein said isomalt contains one or more flavoring agents.

8. The gum of claim 1 wherein said isomalt contains one or more dyes or colorants.

5 9. The gum of claim 1 wherein said granulated additive has a particle size greater than 40 mesh.

10 10. The gum of claim 9 wherein said granulated additive has a particle size range of 30 mesh to 40 mesh.

15 11. The gum of claim 1 wherein said amount of said additive is from about 9% to about 16% by weight of said gum.

12. The gum of claim 11 wherein said amount is from 10% to 15% by weight.

20 13. A process for the preparation of a chewing gum product, said process comprising:

a) preparing a granulated isomalt additive by granulating solid isomalt to a particle size greater than 50 mesh, and,

25 b) blending a crunch-producing effective amount of said additive within said chewing gum product.

30 14. The process of claim 13 which further comprises heating isomalt at a temperature of 130°C or higher and cooling to form said solid isomalt product.

15. The process of claim 14, which further comprises dissolving isomalt in water to form a

solution and heating said solution to above 130°C  
prior to cooling.

16. The process of claim 14 wherein said  
5 isomalt is heated to a temperature of above 145°C.

17. The process of claim 16 wherein said  
temperature is above 160°C.

10 18. The process of claim 13 wherein said  
additive contains one or more adjuvants selected from  
flavorants and colorants.

15 19. The process of claim 13 which further  
comprises screening said granulate to a particle size  
less than 40 mesh prior to said blending step.

20 20. The process of claim 19 wherein said  
granulate is screened to a particle size between about  
30 mesh and 40 mesh.

25 21. The process of claim 13 wherein said  
amount of said additive is from about 9% to about 16%  
by weight of said gum.

22. The process of claim 21 wherein said  
amount of said additive is from 10% to 15% by weight.

30 23. A granulated isomalt additive for  
providing crunch to a chewing gum, said isomalt  
additive prepared by a process wherein isomalt is  
heated at a temperature of above 130°C, cooled to form

a solid isomalt product and granulated to a particle size greater than 50 mesh.

5       24. The additive of claim 23 wherein said chewing gum is a sugarless gum.

10       25. The additive of claim 23 wherein said process further comprises dissolving isomalt in water to form a solution and heating said solution to above 130°C prior to cooling.

15       26. The additive of claim 23 wherein said isomalt is heated to a temperature of above 145°C.

20       27. The additive of claim 26 wherein said isomalt is heated to a temperature of above 160°C.

25       28. The additive of claim 23 wherein said isomalt contains one or more flavoring agents.

30       29. The additive of claim 23 wherein said isomalt contains one or more dyes or colorants.

35       30. The additive of claim 23 wherein said granulated additive has a particle size greater than 40 mesh.

40       31. The additive of claim 30 wherein said granulated additive has a particle size range of 30 mesh to 40 mesh.

45       32. A process for the preparation of a granulated isomalt additive for providing crunch to a chewing gum, said process comprising:

a) heating isomalt at a temperature of 130°C or higher;

b) cooling to form a solid;

c) granulating said solid to a particle  
5 size greater than 50 mesh.

33. The process of claim 32 wherein said chewing gum is a sugarless gum.

10 34. The process of claim 32 which further comprises dissolving isomalt in water to form a solution and heating said solution to above 130°C prior to cooling.

15 35. The process of claim 32 wherein said isomalt is heated to a temperature of above 145°C.

20 36. The process of claim 35 wherein said isomalt is heated to a temperature of above 160°C.

37. The process of claim 32 wherein said isomalt contains one or more flavoring agents.

25 38. The process of claim 32 wherein said isomalt contains one or more dyes or colorants.

39. The process of claim 32 wherein said granulated additive has a particle size greater than 40 mesh.

30 40. The process of claim 39 wherein said granulated additive has a particle size range of 30 mesh to 40 mesh.

**Abstract**

5       A crunchy chewing gum product having a  
crunch similar to that provided by incorporating  
granulated sugar into a sugar-based gum product is  
prepared by introducing, into the interior of a gum  
formulation, a granulated isomalt additive.

**COMBINED DECLARATION FOR PATENT APPLICATION AND  
POWER OF ATTORNEY**

(Includes Reference to PCT International Applications)

Attorney's Docket Number

5079-07-LAV

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

CRUNCHY CHEWING GUM

the specification of which (check only one item below):

- ☒ is attached hereto.
- ☐ was filed as United States application  
 Serial No \_\_\_\_\_  
 on \_\_\_\_\_  
 and was amended  
 on \_\_\_\_\_ (if applicable).
- ☐ was filed as PCT international application  
 Number \_\_\_\_\_  
 on \_\_\_\_\_  
 and was amended  
 on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under United States Code 37 CFR § 119(a-d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a), or of any PCT international application which designated at least one country other than the United States of America listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or any PCT international application having a filing date before that of the application of which priority is claimed:

**Prior Foreign Application(s)**

APPLICATION NUMBER	COUNTRY (if PCT, indicate "PCT")	DATE OF FILING (day, month, year)	PRIORITY CLAIMED
NONE			<input type="checkbox"/> yes <input type="checkbox"/> no
			<input type="checkbox"/> yes <input type="checkbox"/> no

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below:

APPLICATION NUMBER	DATE OF FILING (day, month, year)
NONE	

**Combined Declaration For Patent Application and Power of Attorney (Continued)**  
 (Includes Reference to PCT International Applications)

Attorney Docket Number

5079-07-LAV

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) or § 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information which is material to patentability as defined in 37 CFR, §1.56(a) which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

**PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:**

U.S. APPLICATIONS		STATUS (Check one)		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED
NONE				
PCT APPLICATIONS DESIGNATING THE U.S.				
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)		

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Post Office Address: same

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.